Electronic Health Record (EHR)
Best Practices for Efficiency and Throughput
An Information Paper

Introduction

The EHR is the fundamental tool for patient care delivery. In most organizations, it serves as the mechanism for provider order entry, documentation, coding and billing, operational management, patient flow and patient education. The utility of the record for accomplishing these tasks is directly related to the quality of the design and the ease of use of the interface. As EHRs have developed, clinician input has too often been neglected in pursuit of a more business or technology-focused approach, often due to lack of necessary resources. Unfortunately, this lack of clinician input has created a negative perspective on the utility of the EHR for many clinicians and hides the potential of a well-designed system to enhance provider productivity, optimization of clinical care, safety, patient satisfaction and throughput. This document is intended to help establish a framework for EHR resources and best practices in the emergency department (ED). The allocation of resources to increase provider and clinician input into the EHR and health information technology (IT) systems is important and will lead to significant gains in productivity, clinical care, quality and safety.

EHR Standards for Legibility and Usability

EHRs can improve the legibility of charts; however, they can increase clinician documentation times and increase length of stay (LOS).[1] Emergency physicians (EPs) spend as much as 65% of their time on documentation.[2] Though EHRs can improve legibility, one study showed that the average LOS was increased by 6.3 minutes after implementation of a customized EHR.[1] To improve EHR quality and usability, it would be incumbent upon the industry to design an electronic chart which minimizes perfunctory information (colloquially known as “boilerplate language”) and which maximizes clinically useful content.

Construction of EHRs has been driven by coding and billing requirements established by the federal government and emulated by private third-party payors. Any sound healthcare enterprise, including EHR and data management, should always keep the patient at the center.[3] Federal regulations that stipulate documentation requirements for coding and billing purposes displace patient care from its central importance in the medical record. Such requirements lead to over-charting, invite error through the use of standardized macros or templates, and, at worst, compromise patient care by making important information harder to locate. Furthermore, such documentation requirements contradict the behavior of our patients, many of whom consider the ED to be their first (rather than last) resort for healthcare, as well as their medical home.[4] Emergency medicine, despite being a widely used resource for treatment of ambulatory care sensitive conditions (ACSCs), has been burdened with impractical documentation requirements. The consequence is the modern EHR, which seeks to satisfy federal mandates while providing appropriate clinical information.

Innovation is needed to streamline the documentation of EHRs to improve their utility and minimize the work of documentation. Methods, such as voice recognition software, use of templates, and scribes have helped to offset this work. Restructuring the chart could also help. Some suggestions which have merit and should be explored in EHR development include the following:

1. Parallel charting: maintain separate charts, one for billing and coding data and the other for clinical content; intended to reduce redundant information and improve clinical information flow.
2. Move medical decision-making (MDM) to the top of the chart.
3. Restructure the MDM into a miniature patient-centered chart within the larger medical record.

4. Workflow optimization through use of natural language processing (NLP) and human factors engineering.[5,6]
5. Automatic inclusion of images into the EHR (EKGs, imaging studies, etc.)
6. Revise antiquated coding and billing requirements to enhance record clarity, medical decision making, and care coordination.
7. Ensure the EHR provides tools that are tailored to emergency medicine practice, rather than relying on a repurposed inpatient system.

Guideline for EHR Governance

Best practices in EHR and IT governance in medical organizations require that the physician staff who use computer-based tools have a significant voice in the selection, development and customization of the EHR. This input should extend to other important electronic care tools, such as secure messaging solutions, patient portals, dashboards, patient monitors and any other system that contributes to the care of patients or captures and documents the care physicians provide.[6] Physician input in health IT is essential to ensure that organizational resources are not wasted on inappropriate or ineffective tools. The input of other clinical users, such as nursing staff, must also play a significant role in these decisions on health IT design. Clinical decision support tools and best practice advisories that are established within the EHR should have quality assurance mechanisms established to track utilization and appropriateness, so as to promote quality care without undue barriers or alarm fatigue.

Hospitals should develop IT governing bodies that include a strong clinician presence. All IT steering committees, taskforces, or other organizational structures charged with decision-making responsibilities must have clinician membership to provide an appropriate patient and provider-centered focus to these important decisions. Physicians must be provided ready access to the records they create. This access should include data analytics capabilities with access to databases for queries on population and patient-level data, as well as any associated metadata (the set of data that describes and gives information about other data such as the time it was entered or who entered it). Population health, operations management, academic productivity and the advancement of medical care depends on the ability of providers to access and analyze patient data.

General Tips for Improving Efficiency with EHR customization

Speech-Recognition Software

Leverage efficiency gains offered by speech-recognition software. This technology can be combined with use of a scribe for specific portions of the chart (eg, medical decision making) that require longer passages or may be used alone. In many cases, speech-recognition software may be faster than a scribe, as it can have a built-in knowledge of medical jargon and doesn't require assistance spelling difficult words. In addition, speech-recognition software may be helpful when reviewing, editing, and signing charts later. Some of these technologies offer multi-step functionality that cascades from a single voice command. For example, by simply saying "cosign," the following actions occur: the attending attestation statement will populate the note, the note will be signed, the chart will close, and the next chart will be highlighted.

Macros and Templates

Use macros and templates to ensure EP's meet coding requirements to allow for billing at the appropriate level; however, this should be done with caution to prevent automatically including prechecked components of the history and physical which one did not perform, such as review of systems about which the EP didn't ask, or a part of the physical exam not performed. Consider building a macro/ template that covers the least the EP might ask or perform on a simple patient, or those items that are performed on *every* patient, then use a text expansion functionality (eg, "smart phrases" in EPIC) to insert the remaining parts of the exam. Alternatively, build two macros/templates, one simple and one complex, for each section of the chart, and then select whichever is closest to what was actually done for each

patient and modify it to reflect the individual patient encounter. While this takes a great deal of time at the start, the efficiency gained later is well worth the investment up front. An example of a set of tips based on one particular EHR is included in Appendix A.

Text Expansion

Consider using text expansion capability for common nursing communications not available as specific orders. For example, something like ".lacsupp" could expand to: "Please place the following items at the bedside: size 7.5 sterile gloves, mask with eye shield, 2 packs of size 5.0 sutures, laceration tray, 500 mL bottle of sterile water, splash guard, and 60 mL syringe." Text expansion capability may also be used for patient discharge instructions to ensure the inclusion of necessary return and aftercare instructions. This saves time and avoids generic instructions prepared by various companies, which may conflict with the verbal or written instructions given to patients. While it takes time to create these for every possible diagnosis, it may be reasonable to create a set for the high-volume complaints (eg, chest pain, abdominal pain, laceration), then add others as the need arises.

Filters

Create filters that narrow the results displayed in a list of notes. For example, the EP might have one that only shows notes, only shows notes by a provider (eg, MD/DO, NP, PA), only shows discharge summaries, or only shows procedures. This makes finding historical details far more efficient. Filters can also be used effectively to help manage large, complex tracking boards, by limiting the tracking board to patients located in specific zones, of a specific age, or in a specific status (eg, waiting to be seen, results waiting, admitted). While these filters may allow physicians to properly focus their attention and effectively manage the queue, they can also create operational silos and promote inefficiencies if not properly managed.

Leveraging the EHR for operations management – utilizing dashboards

The amount of information available within an EHR is not limited to the clinical content in the chart. EHR's are a rich source of operational and quality data that should be used to improve ED throughput and quality of care. Access to both the chart data and metadata can provide physicians with important insight into their own practice. This data can also provide hospital administrators with concrete data for the purpose of faculty feedback, operational redesign, quality reporting, business development, and a host of other uses. Real-time EHR database monitoring of throughput and care processes can provide staff with important insights into ED function via dashboards. This allows managers to adjust resources to meet departmental demands. Hospitals should provide informatics support to physician and nursing staff to promote the development of dashboards and the provision of data to monitor important operational metrics.[7]

The Challenge of EHR Transitions

Overview

EHR transitions can be the most challenging time for any organization, department, or physician. Any major transition in workflows and operations has significant associated challenges, such as:

- Inertia
- Physician and staff cooperation
- Legacy providers (the digitally-challenged)
- Cost (initial and maintenance)
- Technical support
- Training
- Workflow challenges
- Productivity loss

Transitions to EHRs illustrate this particularly well. Whether newly implemented (paper to EHR) or switching between systems (from one EHR to another EHR), transitioning to or implementing a new EHR is a complex undertaking. Ideally, inpatient, ED, and outpatient modules are accessible and visible to all providers. The EHR must interface with registration systems, radiology image storage systems, operating room documentation modules, and electronic laboratory processing systems. Well-designed systems additionally interface with other information entities, such as PMPs (prescription monitoring programs) and federal, state or local agencies to which we report (eg, Child Protective Services (CPS), state health departments). Seamless integration of these systems with the EHR encourages improved documentation and timely compliance with reporting responsibilities.

General Principles

- Recognize that the central purpose of the EHR should be documentation of patient care.[3]
- Recognize that the EHR is also a documentation tool geared toward improved billing.
  - The EHR is part of value-based purchasing and governed by "meaningful use."
  - Most EHRs are designed for inpatient or ambulatory services, not the ED.
  - A corollary of the above is that typical EHR modules may not reflect clinical workflows, especially when clinicians have not been involved in their creation or implementation.
- Ensure emergency medicine physician presence at the EHR planning stages.
  - Otherwise, the EP may be relegated to documenting on inpatient or ambulatory care modules that are not appropriate for managing ED workflows.
  - The EP and nursing input in design and implementation gains buy-in and increases the likelihood of a successful implementation.
  - Identify subject matter experts or champions and ensure they are engaged in the process.
  - Prioritize the development of an implementation plan to reduce loss of efficiency during the transition.
  - Develop ED-specific order sets and documentation templates.
  - Ensure that workflows are designed to minimize unnecessary clicks, screen changes and pop-ups.
- Ensure there is ongoing proactive support for the EHR and specifically for the ED during the transition.
  - Once implementation occurs, workflows will dictate necessary adjustments or changes.
  - Frequent communication and an organized, rapid response to complaints and inefficiencies is essential.
  - Dedicated resources will be required to make changes with agility and urgency.
  - Good communication with the vendor and IT is required.
- Plan for EHR interfaces with other important platforms including:
  - Health information exchanges across hospitals and systems
  - Laboratory information systems
  - Radiology image storage systems
  - Patient registration systems
  - Federal and state agencies (Department of Health, Centers for Disease Control and Prevention, CPS)
  - Required databases (such as prescription monitoring programs)
  - Hospital-based information (eg, local antibiogram)
  - Electronic prescription-writing software, ideally with an integrated insurance-driven preferred formulary for each patient
  - Discharge instruction modules and products for transitions of care in multiple languages
  - Patient portals
- Data transparency and management must be developed before implementation.
  - Report building
  - Dashboards
  - Tracking boards for real-time monitoring and troubleshooting
  - Review of calls for IT assistance to support system monitoring and improvement

- Customize the EHR to adapt to workflows (rather than the other way around).
  - Balance EHR accuracy with patient care.
  - Document all important workflows prior to EHR implementation.
  - Build EHR workflows around effective clinical processes.
  - Leverage the new EHR to improve ineffective clinical processes.
- Create redundancy
  - Ensure there are enough computers for all users to promote efficiency.
    - Consider workstations-on-wheels ("WOW"s) available for documentation on the go.
  - Develop broad server capacity to ensure smooth information flow and minimize downtime.
  - Stock significant backup hardware items that can be quickly deployed if needed (computers, keyboards, printers, toner cartridges, paper).
- Utilize the system to optimize safety and promote best practices.
  - Alerts for orders (eg, if ordering a beta lactam antibiotic for a penicillin-allergic patient, drug interactions, high-risk medications or procedures when the patient is pregnant).
  - Logic to drive practice advisories or launch order sets (eg, SIRS criteria can trigger a sepsis order set, automatic routing to airway assessment documentation when sedative agents are ordered, transfer summary launched when a disposition of "transfer" is selected).
  - Set up safe "default" orders that users must opt out of, if necessary (default number of tabs for narcotic prescriptions, default orders for antibiotics to which organisms are highly susceptible based on a local antibiogram).
  - Use prompts to discourage unnecessary interventions.
  - Integrate decision support tools for diagnostic, radiologic and treatment strategies.
- Avoid multiple ways of doing the same thing.
  - Resist the temptation to create a variety of options for providers.
  - Use the opportunity to standardize best practices.
  - Incorporate evidence-based guidelines.
- Communicate with staff to make them aware of the implementation and its benefits.
  - Quality training and education are essential.
  - Satisfaction is improved when end users understand benefits of EHR (eg, clinical decision support, reduced errors in dosing/ adverse drug reactions, consistent documentation).
  - Follow-up training facilitates adoption and efficiency.
  - Appropriate use of "shortcuts," including macros, should be encouraged.
  - Remind the staff that electronic documentation is forever; edits are always discoverable, even when "hidden" for routine chart review.
- Carefully plan for Go-Live.
  - Expect inefficient processing and prolonged times in the ED.
    - Studies show efficiency will improve as users become more comfortable with the system and may return to pre-EHR transition levels, though in some cases times remain prolonged relative to pre-implementation times.
  - Anticipate and budget for additional staffing for several days or weeks to reduce the impact to patient care and offset inefficiencies.
- Design and disseminate down-time procedures for scheduled maintenance and unscheduled system interruptions or failures.
  - Maintain a down-time kit in the ED, containing pre-printed (or rapidly printable) documentation templates order sheets and discharge instructions, so that they can quickly and easily be deployed when needed.
  - Collaborate with other services (including diagnostic services like radiology and laboratory) to determine downtime procedures.
  - Create processes to ensure that all clinical documentation, including consultations and the results of diagnostic testing are captured in the EHR when service is restored.
- Revisit the implementation after three to six months of use.
  - Engage a broad range of users to ensure that inefficiencies that were not anticipated are identified

and remediated.
    - Anticipate the need for adjustments and updates to the implementation in the first six months and ensure that vendors will be able to make those adjustments.

Notes on Transitioning from Paper Records to an EHR

- Depending on paper documentation scheme, be prepared for decreased efficiency.
    - More time at the computer and less time at the bedside should be anticipated.
    - Patients should be educated on the change and the benefits of an EHR.
    - Decreased throughput is frequently experienced, although this is offset by better data capture.
    - New technical difficulties, such as downtime, upgrades, and hardware malfunction, must be planned for.
    - Help desk and support staff in the ED are essential during this transition to trouble shoot problems.
- Benefits that may help achieve buy-in:
    - Improved ability to share information (eg, review previous visits, test results).
    - Legibility is not an issue.
    - Ordering may be streamlined when order sets are used.
    - Customizability and streamlining of documentation with macros.
    - Automatic charge capture (eg, CPTs, RVUs).
    - Data may be more easily extracted.

Important Considerations When Transitioning from One EHR to Another

- Ensure that the new system will be stable, that the new vendor is reliable, and that another transition is not planned for the near future.
- Replicate current workflows (if successful) or improve upon them, if needed.
- Consider the impact on usability and the amount of computer work required.
- Ensure current useful customizations can be replicated in the new EHR.
- Identify opportunities for the new system to solve for deficiencies found in the old EHR.
- Ensure necessary data is able to be extracted from the old system for reporting and tracking after the transition.
- Ensure that necessary data and reports will be available from the new system.

Common Pitfalls to Avoid

- Having the ED use other, non-emergency, documentation modules.
- The ability to adjust time and date stamps.
- Macros that are duplicative and lacking specificity.
- Templated documentation that promotes inaccuracies (eg, “all systems reviewed”).
- Inadvertent upcoding.
- Too many options which promote poor standardization and inadequate application of best practices.
- Taking a back seat during design and implementation – inadequate physician input results in poorly designed systems.

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Additional Articles of Interest

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Appendix A: An Example of Customization Tips and Tricks using Cerner Firstnet

- **Help everyone find orders fast**
  In the Quick Orders Page, default the organization of the most often ordered labs in the ED under tabs such as Top Labs, Top Imaging, Top Medications, etc.

- **Insert a current time date stamp in notes**
  While typing a note, hit the F5 key to place the current date and time in your note.

- **Remember and document clinical scoring tools**
  Use auto text to create drop in text that has scoring criteria into a note. When building the auto text, place an underscore before each criterion. Using the F3 button, move your cursor to the underscore in front of each criterion and indicate positive criteria with an "X". This way, the EP can remember all the elements in the scoring tool, and it will have documented in the record how the EP arrived at this score (eg, HEART score, the Wells Score, CURB score, etc.).

- **Rapidly reorder anything for the patient**
  In the Review Orders screen, right-click any order, whether it be a medication, lab, or anything else, and select COPY. A new order appears on the screen, and then click ORDERS FOR SIGNATURE, and then sign the order.

- **Quickly write a prescription for any medication you ordered in the emergency department**
  Right-click on any medication given in the ED in the Review Orders view. Choose CONVERT TO PRESCRIPTION. If the EP orders the medication IM or IV, this can be converted to an oral formulation by activating the drop-down list and clicking on the medication name in the next screen. All formulations of the medication will be displayed.

- **Change the background color and appearance of your note (for your view only)**
  Open patient chart and documentation section.
  Start note.
  Click on VIEW in the menu bar.
  Click on CUSTOMIZE.
  Under COLOR tab - choose TEXT BACKGROUND COLOR and pick the color desired.
  Click APPLY.
  Under FONT tab - scroll to NORMAL FONT and then pick the font desired.
  Pick BOLD or ITALIC or UNDERLINE, if desired.
  Then click APPLY.

- **Rapidly create auto text (to use over and over)**
  Highlight any text to create an auto text out of it.
  Right click the highlighted text.
  Choose SAVE AS AUTOTEXT.
  Write an abbreviation (name) for the auto text.
  Click SAVE.

- **Rapidly check of all entries in a checkbox form in a standard way (create a macro)**
  For example, if an EP always fills out the review of systems in a certain way for a certain complaint, the EP can save this completed review of systems using a macro, so with one click they can check all the boxes that they normally would.

  After completing a note section, right click on that section's title.
  Choose SAVE AS MACRO.
  Choose a title.
  Click SAVE AS NEW MACRO.
  There will now be a small icon next to that title that, when clicked, will have a list of the EP's macros for that section.

- **Attending physicians (academic centers) track their note completion**
  In some configurations, the note completion icon (the clipboard icon that changes color from red to yellow to green) on Firstnet defaults to the house staff taking care of that patient. Supervising attending physicians can set up their notes so that the clipboard will work for their notes, as well.

Instructions:
For this to work, the EP must write the notes via the PROVIDER NOTES tab rather than the NOTES tab. First, the EP must create a pre-completed favorite note using any brief template. To set this up:

- Click on the PROVIDER NOTES tab.
- Click the Blue +Add button at the top.

- Click the ENCOUNTER PATHWAY tab.
- Search for any brief pre-existing note (doesn't have much templating already in it)
- If an auto populate box appears, unselect everything and click OK.
- When the note appears, click into the body and type the standard text that is in the note (if any). This can also be added later using an auto text.
- Go the Documentation Menu and choose SAVE AS PRECOMPLETED NOTE.
- Confirm that the note title is as intended or change to something else.
- Choose SAVE AS NEW.
- The note can be canceled, and changes discarded if a note is not needed at this time.
- Now go back to PROVIDER NOTES and click the Blue +Add again.
- This time, choose the PRECOMPLETED tab.
- Select the pre-completed note just created and click ADD TO FAVORITES.
- Now click the FAVORITES tab and select the button for MY PRECOMPLETED NOTES ONLY.
- From now on, when the EP goes to PROVIDER NOTES and clicks the Blue +Add, they will be taken straight there. Double click on the pre-completed note, and it will be ready for the notes. The EP can create as many versions as desired to cover different scenarios.
- When assigned to a patient, a red icon will appear in the Notes column. When a partially completed note is saved, it will turn yellow. When the note is signed and submitted, it will turn green. If a resident forwards a note for co-signature, the EP will see a second icon next to theirs. Signing the resident note will result in a green icon if the EP did not already have a partially written note saved.

NOTE: This will not work if an attending starts a note as a regular NOTE rather than a PROVIDER NOTE and another EP takes over and wishes to just add their note.

Suggested workflow during a shift:

- Look for the red icons. When a red icon is seen, make sure to start a note so that the icon turns yellow and the note will be in the EP's message center as a SAVED note.
- At the end of the shift, check for any red or yellow icons. The EP can filter by "My Patients" if that is an option in the EHR configuration.

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